MAY 1996
Includes Spring Summary

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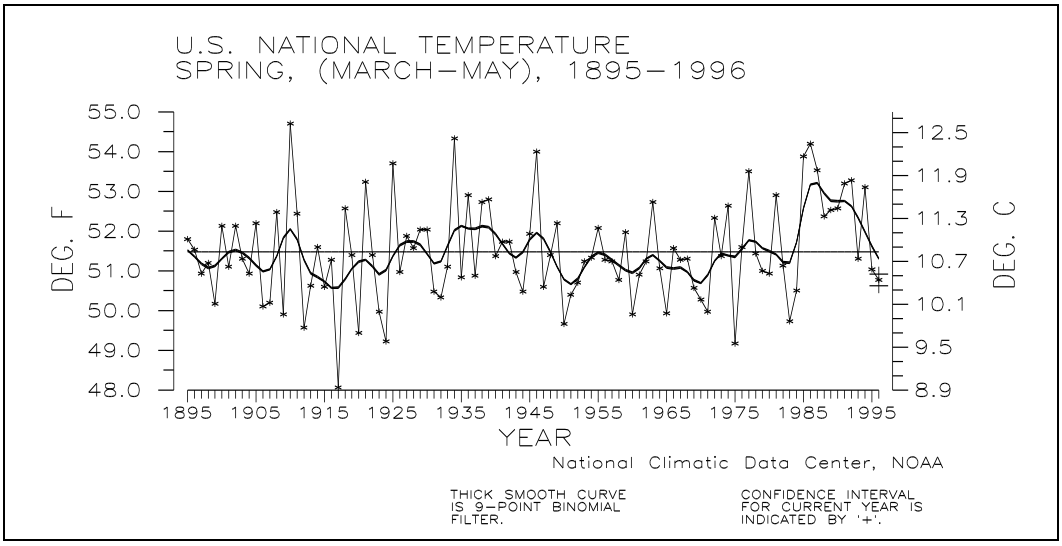
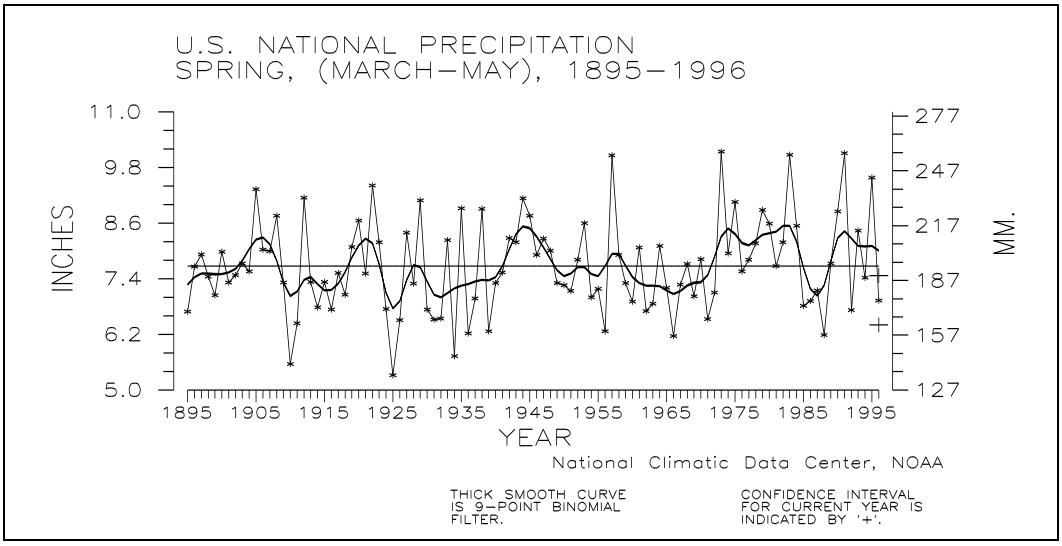
CLIMATE VARIATIONS BULLETIN





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This CLIMATE VARIATIONS BULLETIN (CVB) is a preliminary report that puts current monthly climate anomalies into historical perspective using climate databases archived at the National Climatic Data Center (NCDC). It is issued on a monthly basis. Supplemental sections are included which address seasonal and annual perspectives, when appropriate.

Current data are based on preliminary reports from First and Second Order airport stations obtained from the National Weather Service (NWS) Climate Prediction Center (formerly, Climate Analysis Center), and preliminary tornado statistics obtained from the NWS National Severe Storms Forecast Center. THE CURRENT DATA SHOULD BE USED WITH CAUTION. These preliminary data are useful for estimating how current anomalies compare to the historical record, however the actual values and rankings for the current year will change as the final data arrive at NCDC and are processed.

The following NCDC datasets are used for the historical data: the climate division drought database (TD-9640), the hurricane datasets (TD-9636 and TD-9697), the tornado dataset (STORM DATA), and the monthly station dataset (LCD supplemental files). It should be noted that the climate division drought database consists of monthly data for 344 climate divisions in the contiguous United States. These divisional values are calculated from the 6000+ station Cooperative Observer network.

The narrative, tables, and graphs in the CVB are also available via automated facsimile. The previous month's summary can be obtained after the tenth of the month by dialing 704-271-4570 and selecting the appropriate menu codes. A touch-tone fax machine is required.

If you have access to the Internet, copies of the CVB are available via both the NCDC's World Wide Web (WWW) server and the NCDC's anonymous FTP server.

NCDC's WWW server
URL for the CVB: http://www.ncdc.noaa.gov/publications/cvb/cvb.html

NCDC's anonymous FTP server
Machine: ftp.ncdc.noaa.gov
Directory: /pub/data/cvb

If you are a climate researcher and would like to order copies of the historical datasets used to make graphs of the type in this report, call 704-271-4994 or fax a letter to 704-271-4876 or mail a letter to the address given below, ATTN: Research User Services.

All other questions or requests for data should be made by calling 704-271-4800 or sending a fax to 704-271-4876 or by writing to:

National Climatic Data Center, NOAA
Federal Building
151 Patton Avenue, Room 120
Asheville, NC 28801-5001

If you use any of the information from this CVB, please identify "National Climatic Data Center, NOAA" as the source.

UNITED STATES MAY AND SPRING CLIMATE IN HISTORICAL PERSPECTIVE

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MAY 1996

Preliminary data for May 1996 indicate that temperature averaged across the contiguous United States was above the long-term mean (see Figure 1). May 1996, with an averaged temperature of 61.5° (F), ranked as the 33rd warmest May since national records began in 1895. The 1996 value is based on preliminary data, which has been shown to be within 0.29°F (0.16°C) of the final data over a 7-year period. This confidence interval is indicated in the figure by '+'. The darker smooth curve is a nine-point binomial filter that averages out the year-to-year fluctuations and shows the longer-term variations. Thirty percent of the country averaged much warmer than normal while 13.9% of the country averaged much cooler than normal for May 1996.

With an areally-averaged national precipitation value of 2.91 inches, May 1996 was the 43rd wettest May on record. The preliminary value for precipitation is estimated to be accurate to within 0.32 inches (8.13 millimeters) and the confidence interval is plotted in Figure 2 as a '+'. Nearly 20% of the country experienced much wetter than normal conditions while an additional 20% was much drier than normal.

Historical precipitation is shown in a different way in Figure 3. The May precipitation for each climate division in the contiguous U.S. was first standardized using the gamma distribution over the 1931-90 period. These gamma-standardized values were then weighted by area and averaged to determine a national standardized precipitation value. These national weighted values were then normalized over their period of record. Negative values are drier and positive values are wetter than the mean. This index gives a more accurate indication of how precipitation across the country compares to the local normal (60-year average) climate. The preliminary national standardized precipitation ranked May 1996 as the 32nd driest such month on record. This standardized z-score is estimated to be accurate to within 0.203 index units and the confidence interval is plotted in Figure 3 as an 'X'.

National averaged temperature for the five-month period January-May 1996 is shown in Figure 4. Temperature for the five-month period was only slightly below the long-term mean ranking as the 47th coolest such period since 1895.

In order to show more of a historical perspective, the precipitation and temperature rankings for the periods December 1995-May 1996 and June 1995-May 1996, and the May 1996 temperature rankings and categorical precipitation standings for the nine climatically homogeneous regions, as well as the national rankings, are listed in Table 1.

The regional rankings for temperature for the month of May indicate that temperatures were warmer than normal for the southern tier states and cooler than normal for the northern half of the country excluding the Central region. A persistent upper-level ridge contributed to the second warmest May on record for both the South region (Figure 5) and the Southwest region. The West region had the 28th warmest May since 1895 while the Southeast had the 29th warmest May on record. It was the 11th coolest May for the Northwest region (Figure 6), the 18th coolest May for the West-North Central region, and the 19th coolest such month for the East-North Central region .

The Southeast, South and Southwest regions were within the dry-third of the historical distribution for May due to the aforementioned upper-level flow pattern. This same pattern allowed the remainder of the country to be near to or wetter than normal.

Figure 7A shows, in illustrative map form, the May 1996 temperature rankings for the 48 contiguous states. Seven states were within the top ten warmest of the historical distribution. May 1996 was the warmest such month on record for New Mexico and Texas, and third warmest for Arizona and Oklahoma. It was the fourth warmest May since 1895 for Arkansas, fifth warmest for Mississippi and seventh warmest for Louisiana. Twelve other states were within the warm third of the distribution. Three states were within the top ten coolest category of the historical distribution for the month of

May while 15 others were within the cool third of the distribution. Montana and Washington had the third coolest May on record while May 1996 was the fifth coolest such month on record for Delaware.

May 1996 state categorical ranks for precipitation are shown in Figure 7B. Twenty states ranked within the wet-third of the historical distribution while 15 states ranked within the dry third. ***It should also be noted that these May state categorical precipitation ranks are preliminary and should be used with considerable caution due to the high variability of precipitation on a small space and time scale.***

Figure 8A shows the year-to-date temperature rankings for the 48 contiguous states. The year-to-date is the warmest such period on record for Arizona, the second warmest such five-month period for New Mexico, fifth warmest for California, and the tenth warmest January-May period for Nevada. Four other states ranked within the warm-third of the distribution. Two states, Delaware and Michigan, ranked within the top ten cool portion of the distribution along with an additional 21 which ranked within the cool-third of the historical distribution.

The year-to-date state categorical ranks for precipitation are shown in Figure 8B. Twenty-three states ranked within the wet-third of the historical distribution while 16 states ranked within the dry third. ***It should also be noted that these state categorical precipitation ranks are preliminary and should be used with considerable caution due to the high variability of precipitation on a small space and time scale.***

Long-term drought coverage in the United States during May increased while the area of the country experiencing severe to extreme wetness also increased. Nationally, long-term drought conditions (as defined by the Palmer Drought Index) for May 1996 increased to about 22% of the country while the percent coverage of severe to extreme wet area grew to nearly a fifth of the country (Figure 9). Table 2 lists the percent area statistics for selected river basins for the 1995-1996 Hydrologic Year. The core wet areas included the northern Great Plains, the northern Rockies, and portions of the Pacific Northwest, Great Basin, and Ohio Valley. The Palmer dry areas included the Desert Southwest, central and southern Rockies, central and southern High Plains, central and southern Plains, and lower Mississippi valley.

The Palmer Drought Index for the South region for the period January 1901 through May 1996 is shown in Figure 10. The rapid onset of drought conditions parallel those seen in the early 1980's and the 1960's. The magnitude of the 1996 drought index is comparable to that of the early 1950's, although the duration of the current drought is considerably shorter. The South region states include Texas, Louisiana, Mississippi, Kansas, Oklahoma, and Arkansas.

The Palmer Drought Index for the West-North Central region for the period January 1901 through May 1996 is shown in Figure 11. Wet conditions have persisted since earlier this decade and the positive anomaly of the current episode rivals that of the late teen's decade.

Precipitation across the Primary Corn and Soybean Belt for the three-month period averaged slightly above normal for the March-May growing season-to-date (Figure 12). Five of the last seven such growing seasons have had above normal precipitation amounts.

Table 3 shows extremes, 1961-90 normals, and the May 1996 values for both precipitation and temperature for the nine regions and the contiguous U.S.

According to preliminary data from the National Weather Service's National Severe Storms Forecast Center, there were 310 tornadoes across the contiguous United States in May 1996. The 1953-1995 average tornado count for May is 176. Sixty-eight tornadoes were reported in May 1958 while 390 were documented in May 1995. It should be noted that the preliminary tornado count is generally higher than the final count.

SPRING 1996

Preliminary spring (March-May) data for 1996 indicate that temperature averaged across the contiguous United States was below the long-term mean (Figure 13), ranking as the 27th coolest spring on record (Table 4). Twenty percent of the country averaged much cooler than normal while about 14% averaged much warmer than normal for the spring season.

Areally-averaged spring precipitation for the nation was below the long-term mean, ranking spring season 1996 as the 25th driest such season in the 102-year record (Figure 14). The national standardized precipitation index (Figure 15) ranked spring 1996 as

the seventh driest spring on record. (The preceding monthly report explains how this index is computed.)

The temperature ranks and precipitation categorical ranks for the spring season, March through May 1996, for the nine climatically homogeneous regions in the United States are listed in Table 4. The average spring temperature pattern was characterized by a simple ridge-trough pattern, with unusual warmth in the West and Southwest and temperatures considerably below normal from the northern Plains to the Southeast and northward. The preliminary data indicate that the East-North Central region had the third coolest spring season since 1895 (Figure 16) while the Southwest region ranked ninth warmest (Figure 18). Unusual spring warmth has dominated the Southwest region for most of the last dozen years.

The spring season precipitation categorical rankings (Table 4) show a wet season occurred for the Northwest and Central regions. The West, Southwest, South, and East-North Central regions were each in the dry third of the historical distribution for the Spring season. The March through May period was the second driest such season for the South region (Figure 19) while the Southwest region had the driest Spring since 1895 (Figure 20). Precipitation was much above the long-term mean for the Northwest region making for the 19th wettest spring since 1895 (Figure 21) while at the same time, the Central region had the 15th wettest spring season since records began (Figure 22).

Table 5 shows extremes, 1961-1990 normals, and the 1996 spring season values for both precipitation and temperature for the nine regions and the contiguous U.S.

Figure 17A shows, in illustrative map form, the Spring 1996 temperature rankings for the 48 contiguous states. Ten states were within the top ten coolest of the historical distribution. Spring 1996 was the second coolest such season for Delaware, third coolest for Minnesota, and fifth coolest for Illinois, Indiana, Iowa, North Dakota, South Dakota, and Wisconsin. Nineteen other states ranked within the cool third of the historical distribution for the spring season. It was the fourth warmest spring on record for Arizona and the seventh warmest such season for New Mexico. Four other states ranked within the top ten warm portion of the distribution.

Spring state categorical ranks for precipitation are shown in Figure 17B. Nineteen states ranked within the dry third of the distribution while 15 states ranked within the wet third. As with the May statistics, it should be noted that these categorical precipitation ranks are preliminary and should be used with considerable caution.

According to preliminary data from the National Weather Service's National Severe Storms Forecast Center, there were 576 tornadoes across the contiguous United States during the three-month spring season (Figure 23). The 1953-1995 average spring tornado count is 337. The extremes: 159 tornadoes in 1958 and 700 in 1991. It should be noted that the preliminary tornado count is generally higher than the final count and that the tornado observations have generally improved with time as better observing practices and instrumentation (especially weather radar and satellites) were utilized.

TABLE 1. PRECIPITATION AND TEMPERATURE RANKS, BASED ON THE PERIOD 1895-1996. 1 = DRIEST/COLDEST, 102 = WARMEST FOR MAY 1996 TEMPERATURES, 101 = WETTEST/WARMEST FOR DEC 1995-MAY 1996, 101 = WETTEST/WARMEST FOR JUN 1995-MAY 1996. PRESENT MONTH PRECIPITATION EXPRESSED CATEGORICALLY: WET = WET 1/3 OF THE HISTORICAL DISTRIBUTION, MID = WITHIN THE MIDDLE 1/3 OF THE DISTRIBUTION, DRY = DRY 1/3 OF THE HISTORICAL DISTRIBUTION.

REGION	MAY 1996	DEC 1995-MAY 1996	JUN 1995-MAY 1996
PRECIPITATION:			
NORTHEAST	MID	68	70
EAST NORTH CENTRAL	MID	38	58
CENTRAL	WET	66	50
SOUTHEAST	DRY	36	83
WEST NORTH CENTRAL	WET	61	82
SOUTH	DRY	2	3
SOUTHWEST	DRY	1	2
NORTHWEST	WET	94	99
WEST	WET	72	45
NATIONAL	MID	27	35
TEMPERATURE:			
NORTHEAST	23	25	36
EAST NORTH CENTRAL	19	11	16
CENTRAL	65	22	23
SOUTHEAST	74	14	14
WEST NORTH CENTRAL	18	27	25
SOUTH	101	64	56
SOUTHWEST	101	98	99
NORTHWEST	11	64	71
WEST	75	97	99
NATIONAL	70	49	53

TABLE 2.
STATISTICS FOR SELECTED RIVER BASINS:
AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG-TERM (PALMER) DROUGHT, AND AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG-TERM (PALMER) WET CONDITIONS, AS OF MAY 1996.
RIVER BASIN REGIONS AS DEFINED BY THE U.S. WATER RESOURCES COUNCIL.

RIVER BASIN	% AREA DRY	% AREA WET
MISSOURI BASIN	.0%	34.6%
PACIFIC NORTHWEST BASIN	.0%	63.1%
CALIFORNIA RIVER BASIN	28.8%	21.3%
GREAT BASIN	39.0%	18.2%
UPPER COLORADO BASIN	25.0%	.0%
LOWER COLORADO BASIN	100.0%	.0%
RIO GRANDE BASIN	94.6%	.0%
ARKANSAS-WHITE-RED BASIN	33.5%	.0%
TEXAS GULF COAST BASIN	90.7%	.0%
SOURIS-RED-RAINY BASIN	.0%	63.5%
UPPER MISSISSIPPI BASIN	.0%	11.8%
LOWER MISSISSIPPI BASIN	22.2%	.0%
GREAT LAKES BASIN	.0%	9.5%
OHIO RIVER BASIN	.0%	29.2%
TENNESSEE RIVER BASIN	.0%	.0%
NEW ENGLAND BASIN	.0%	7.7%
MID-ATLANTIC BASIN	.0%	19.0%
SOUTH ATLANTIC-GULF BASIN	.0%	9.4%

TABLE 3. EXTREMES, 1961-90 NORMALS, AND 1996 VALUES FOR MAY. IT SHOULD BE NOTED THAT THE 1996 VALUES WILL CHANGE DUE TO THE USE OF A DENSER STATION NETWORK.

PRECIPITATION (INCHES)

REGION	DRIEST VALUE	DRIEST YEAR	WETTEST VALUE	WETTEST YEAR	NORMAL PCPN	1996 PCPN
NORTHEAST	.98	1903	7.25	1984	3.79	3.76
EAST NORTH CENTRAL	1.15	1934	6.23	1908	3.29	3.68
CENTRAL	1.65	1934	8.03	1995	4.47	6.69
SOUTHEAST	.97	1941	7.61	1976	4.21	2.94
WEST NORTH CENTRAL	.65	1934	4.63	1962	2.57	3.75
SOUTH	1.90	1988	7.33	1935	4.17	2.14
SOUTHWEST	.19	1974	2.31	1992	1.01	.51
NORTHWEST	.30	1924	3.67	1915	1.79	2.84
WEST	.07	1924	2.75	1915	.73	1.22
NATIONAL	1.78	1934	4.15	1957	2.91	2.91*

* PRELIMINARY VALUE, CONFIDENCE INTERVAL + OR - .32 INCHES

TEMPERATURE (DEGREES F)

REGION	COLDEST VALUE	COLDEST YEAR	WARMEST VALUE	WARMEST YEAR	NORMAL TEMP	1996 TEMP
NORTHEAST	48.7	1917	61.7	1911	55.5	53.7
EAST NORTH CENTRAL	46.8	1907	63.7	1977	56.0	52.7
CENTRAL	56.7	1917	69.8	1962	62.8	64.1
SOUTHEAST	65.9	1917	74.4	1896	69.3	71.2
WEST NORTH CENTRAL	47.2	1907	62.6	1934	53.7	50.3
SOUTH	65.1	1907	75.3	1896	70.2	75.3
SOUTHWEST	51.7	1917	64.3	1934	58.8	63.0
NORTHWEST	47.7	1896	58.5	1958	52.3	49.6
WEST	53.5	1977	65.6	1992	59.6	61.1
NATIONAL	55.7	1917	65.1	1934	60.7	61.5*

* PRELIMINARY VALUE, CONFIDENCE INTERVAL + OR - .3 DEG. F.

TABLE 4. TEMPERATURE AND PRECIPITATION RANKINGS FOR MARCH-MAY 1996, BASED ON THE PERIOD 1895-1996.
1 = COLDEST, 102 = HOTTEST.
PRECIPITATION EXPRESSED CATEGORICALLY:
WET = WET 1/3 OF THE HISTORICAL DISTRIBUTION,
MID = WITHIN THE MIDDLE 1/3 OF THE DISTRIBUTION,
DRY = DRY 1/3 OF THE HISTORICAL DISTRIBUTION.

REGION	PRECIPITATION	TEMPERATURE
NORTHEAST	MID	21
EAST NORTH CENTRAL	DRY	3
CENTRAL	WET	16
SOUTHEAST	MID	15
WEST NORTH CENTRAL	MID	12
SOUTH	DRY	61
SOUTHWEST	DRY	94
NORTHWEST	WET	48
WEST	DRY	85
NATIONAL	DRY	27

TABLE 5. EXTREMES, 1961-90 NORMALS, AND 1996 VALUES FOR MARCH-MAY

PRECIPITATION (INCHES)

REGION	DRIEST VALUE	DRIEST YEAR	WETTEST VALUE	WETTEST YEAR	NORMAL PCPN	1996 PCPN
NORTHEAST	5.65	1915	16.86	1983	10.35	10.52
EAST NORTH CENTRAL	3.82	1934	11.66	1991	7.81	6.63
CENTRAL	6.98	1941	18.55	1927	12.34	14.98
SOUTHEAST	6.77	1914	18.29	1980	12.48	11.51
WEST NORTH CENTRAL	2.22	1934	7.57	1995	5.21	5.38
SOUTH	5.89	1925	17.04	1957	9.98	6.15
SOUTHWEST	1.16	1996	6.62	1941	2.86	1.16
NORTHWEST	2.13	1924	9.41	1993	6.48	7.64
WEST	.93	1909	10.15	1995	4.18	3.30
NATIONAL	5.32	1925	10.14	1973	7.76	6.93*

* PRELIMINARY VALUE, CONFIDENCE INTERVAL + OR - .53 INCHES

TEMPERATURE (DEGREES F)

REGION	COLDEST VALUE	COLDEST YEAR	WARMEST VALUE	WARMEST YEAR	NORMAL TEMP	1996 TEMP
NORTHEAST	40.0	1926	49.4	1921	44.4	42.7
EAST NORTH CENTRAL	37.8	1950	49.9	1977	43.3	38.8
CENTRAL	48.6	1960	57.7	1977	53.1	51.0
SOUTHEAST	59.0	1960	65.9	1908	62.0	60.8
WEST NORTH CENTRAL	36.9	1917	48.0	1910	42.6	39.2
SOUTH	57.7	1931	65.4	1963	62.2	62.3
SOUTHWEST	44.6	1917	55.4	1934	50.2	52.4
NORTHWEST	40.4	1955	52.0	1934	45.3	45.2
WEST	48.9	1896	59.1	1934	52.6	54.9
NATIONAL	48.1	1917	54.7	1910	51.6	50.8*

* PRELIMINARY VALUE, CONFIDENCE INTERVAL + OR - .2 DEG. F.

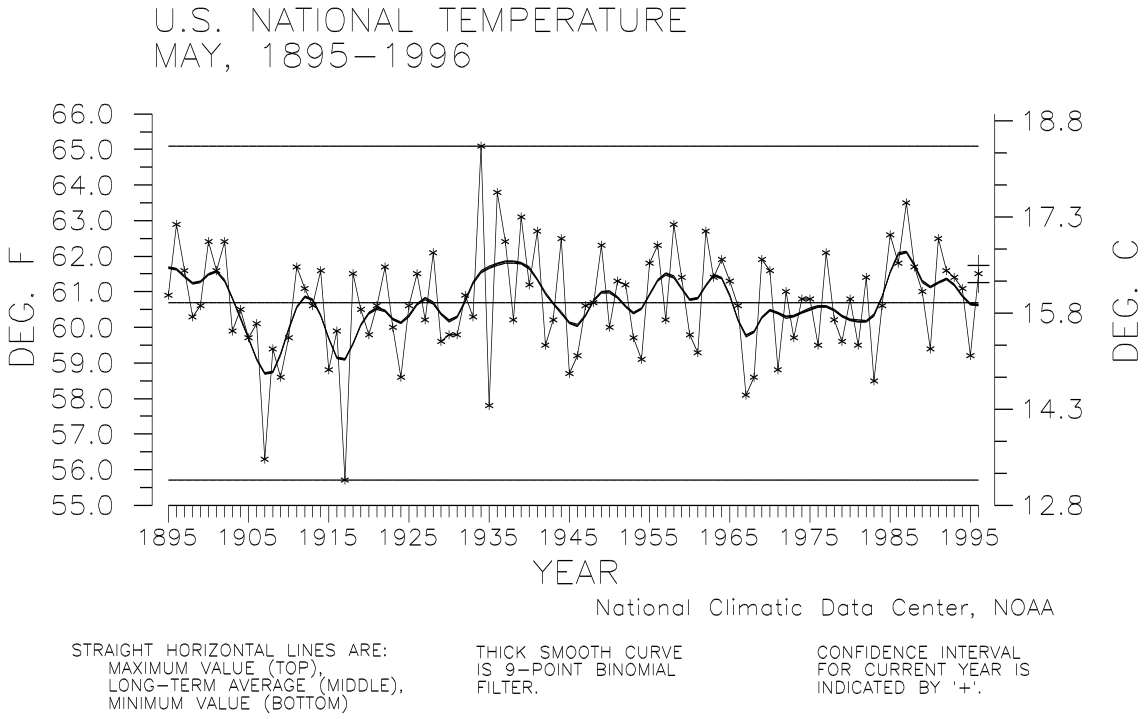

Figure 1

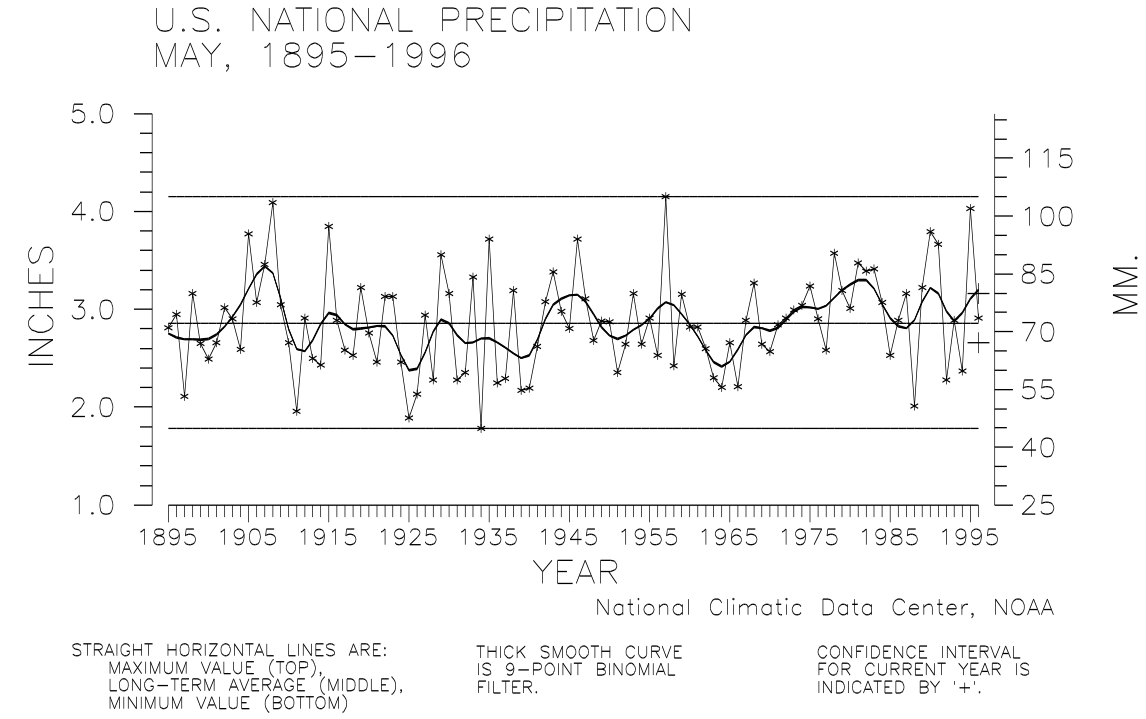

Figure 2

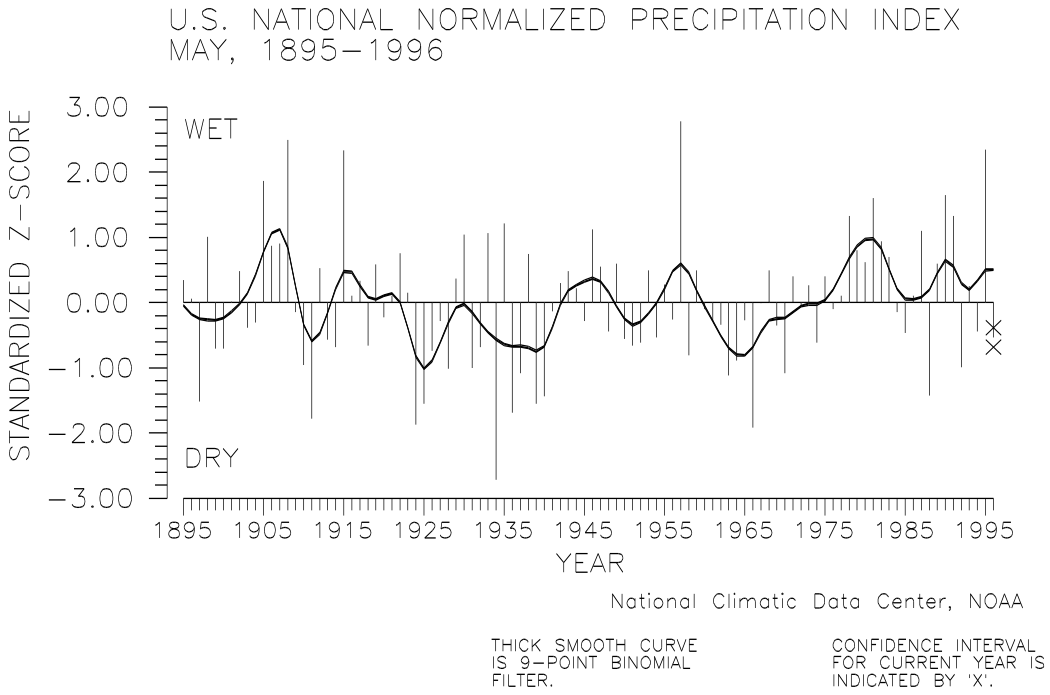

Figure 3

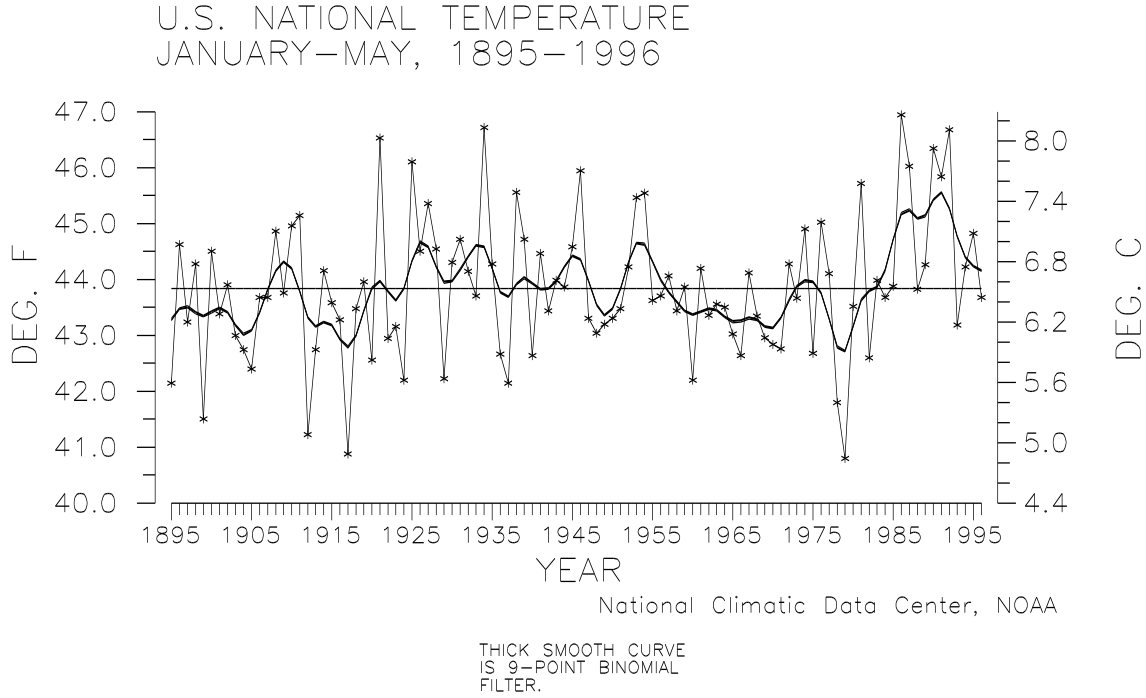

Figure 4

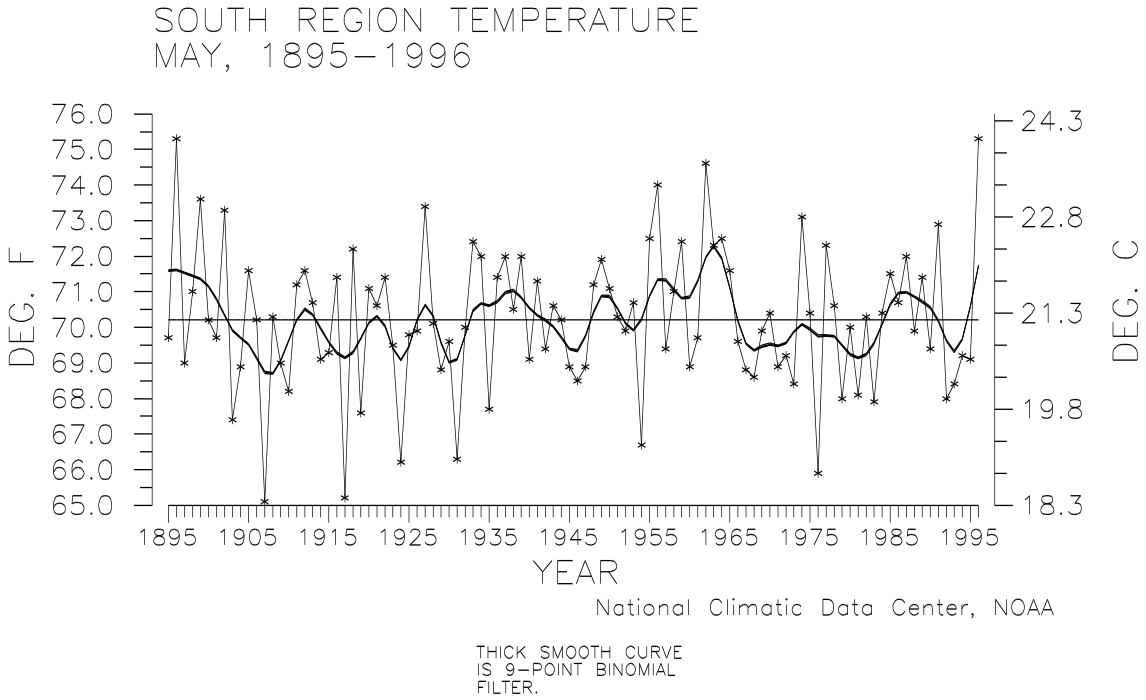

Figure 5

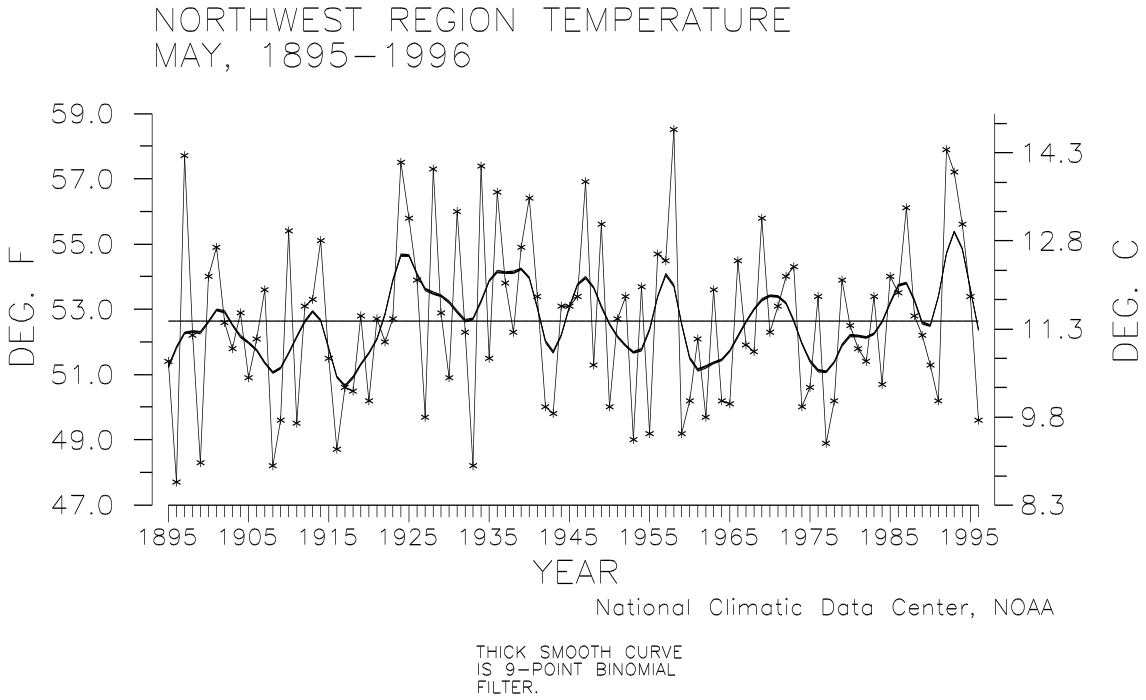

Figure 6

MAY 1996 STATEWIDE RANKS

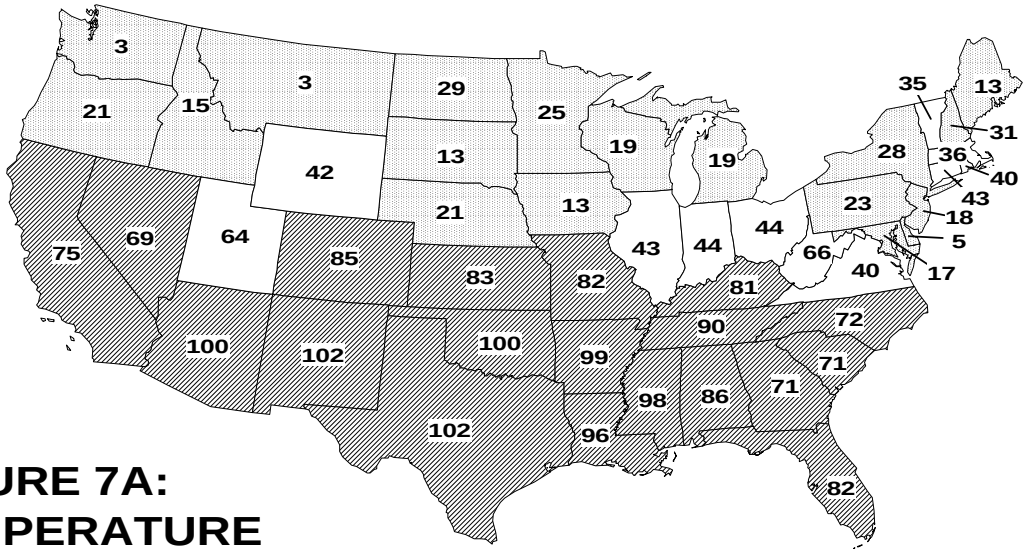

FIGURE 7A: TEMPERATURE

1 = Coldest
102 = Warmest

Temperature Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the warm third or cool third of their historical distribution are shaded.

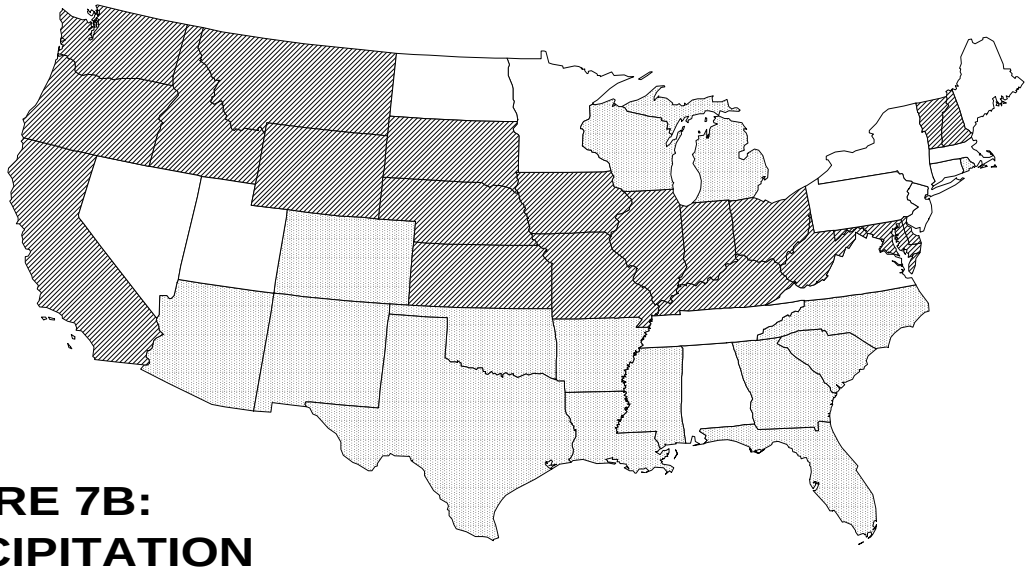

FIGURE 7B: PRECIPITATION

National Climatic Data Center, NOAA

Wet Third
Middle Third
Dry Third

Precipitation Rank Categories for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the wet third or dry third of their historical distribution are shaded.

JANUARY-MAY 1996 STATEWIDE RANKS

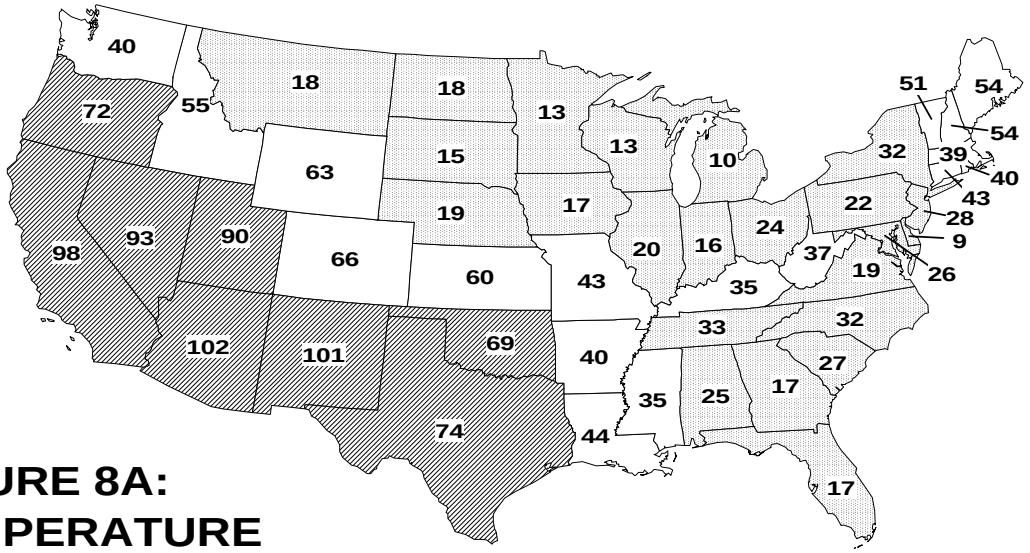

FIGURE 8A: TEMPERATURE

1 = Coldest
102 = Warmest

Temperature Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the warm third or cool third of their historical distribution are shaded.

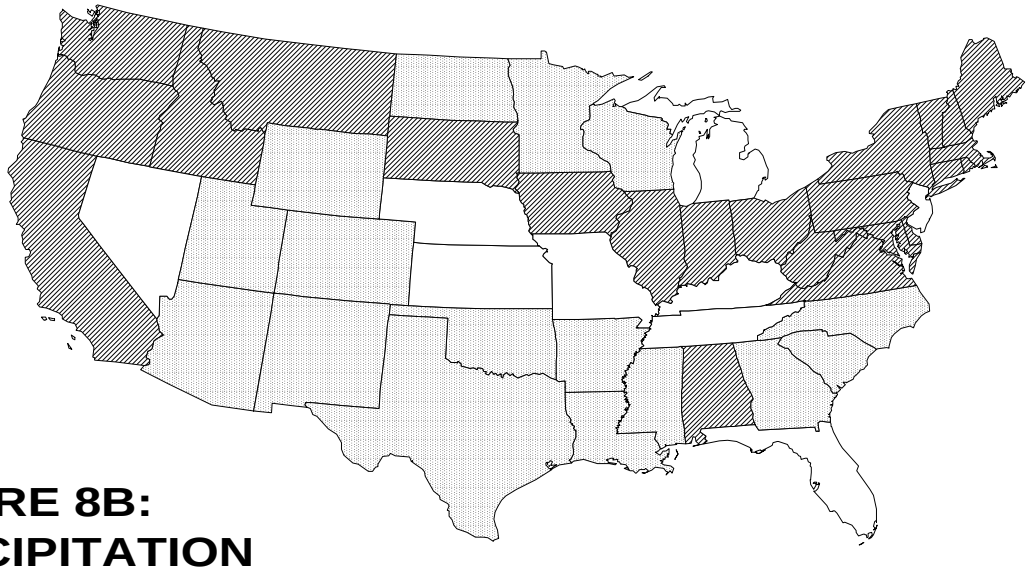

FIGURE 8B: PRECIPITATION

National Climatic Data Center, NOAA

Wet Third

Middle Third

Dry Third

Precipitation Rank Categories for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the wet third or dry third of their historical distribution are shaded.

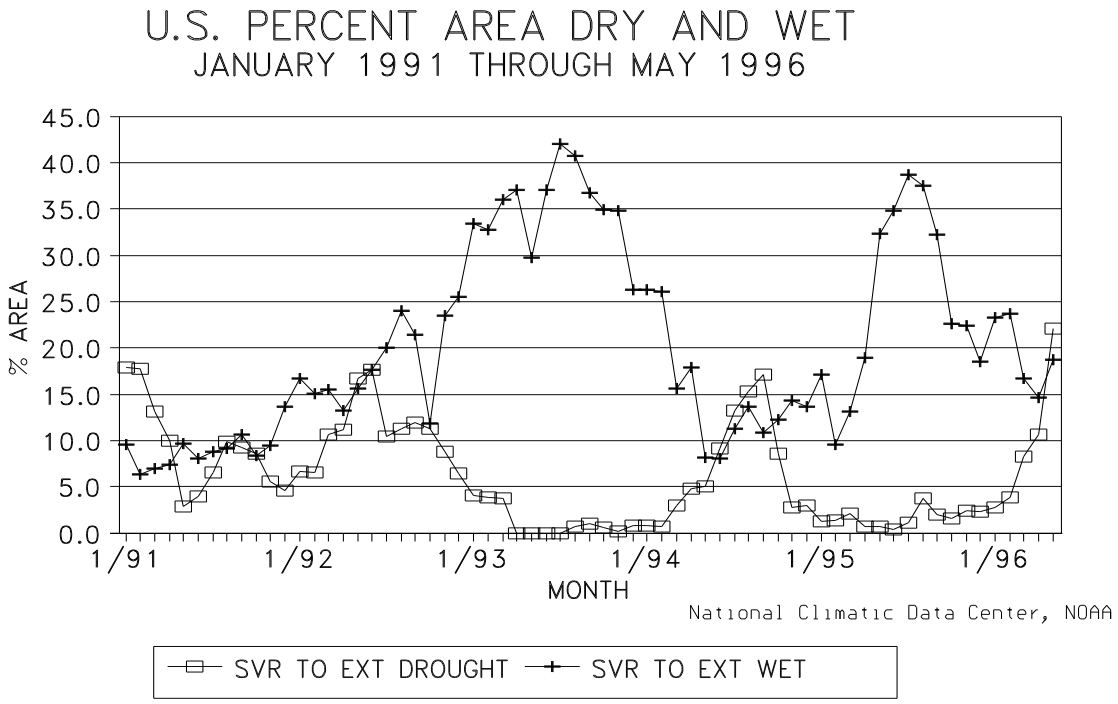

Figure 9

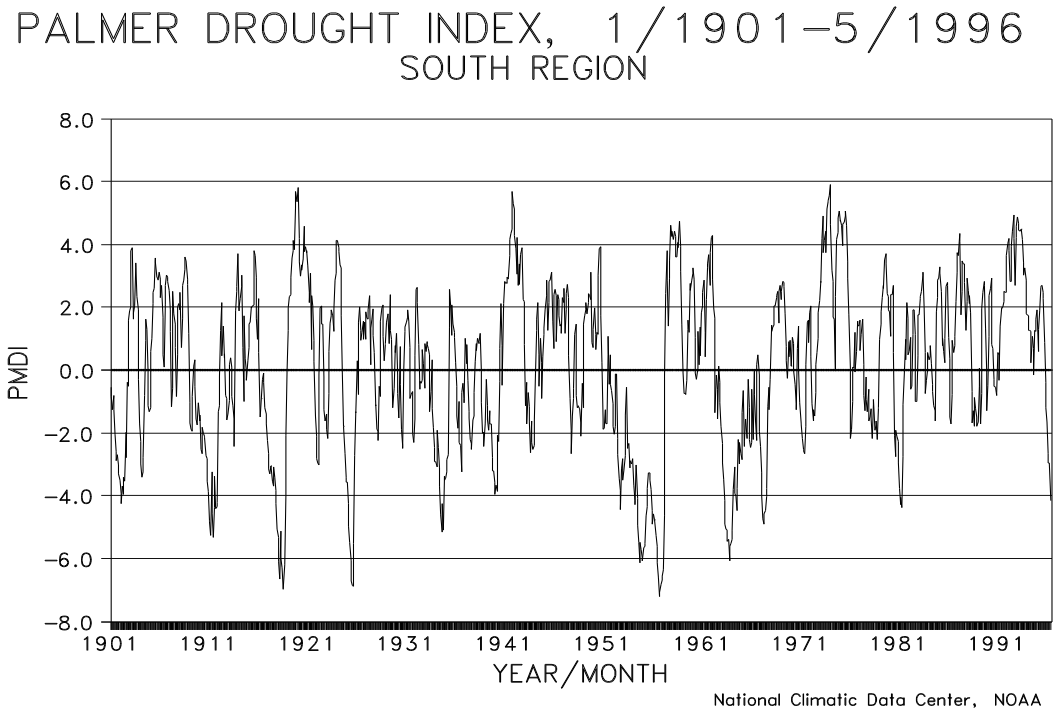

Figure 10

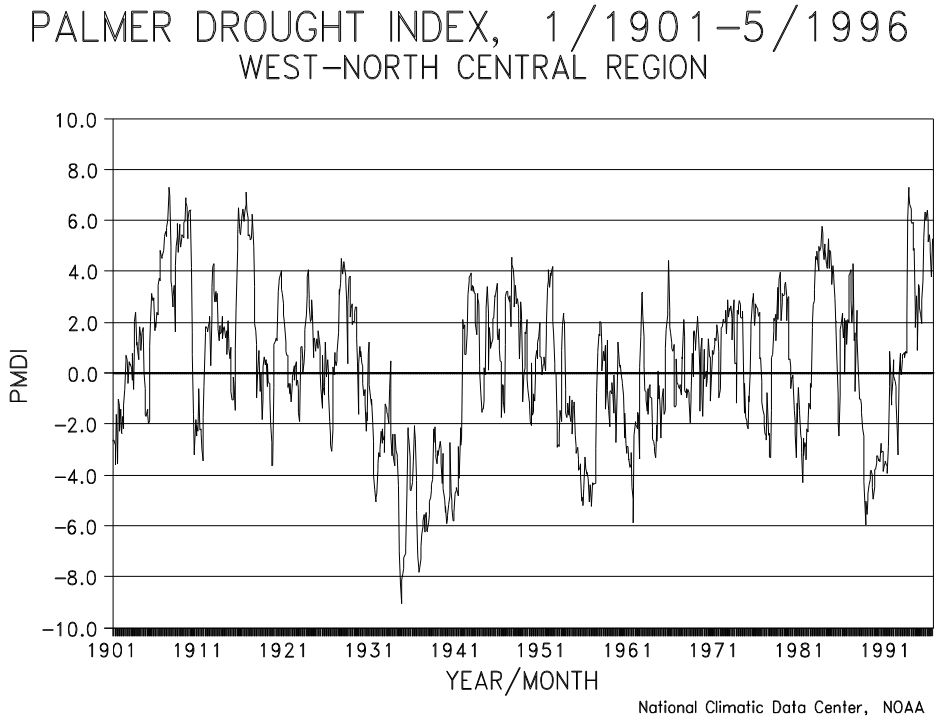

Figure 11

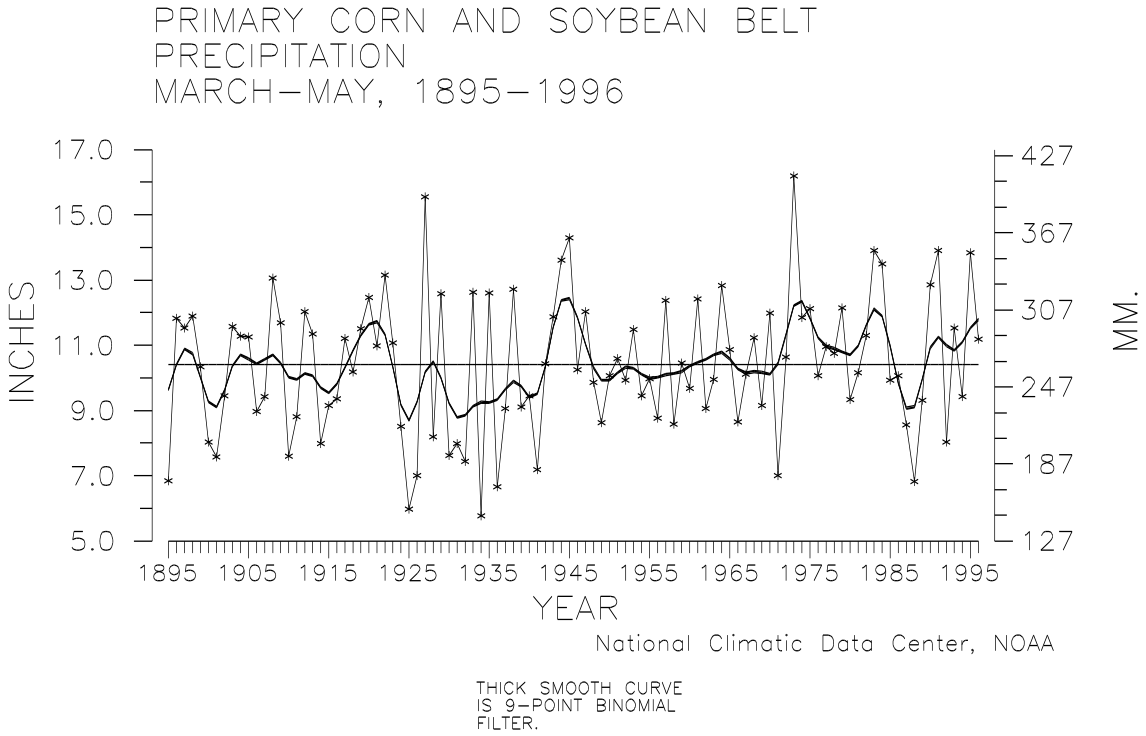

Figure 12

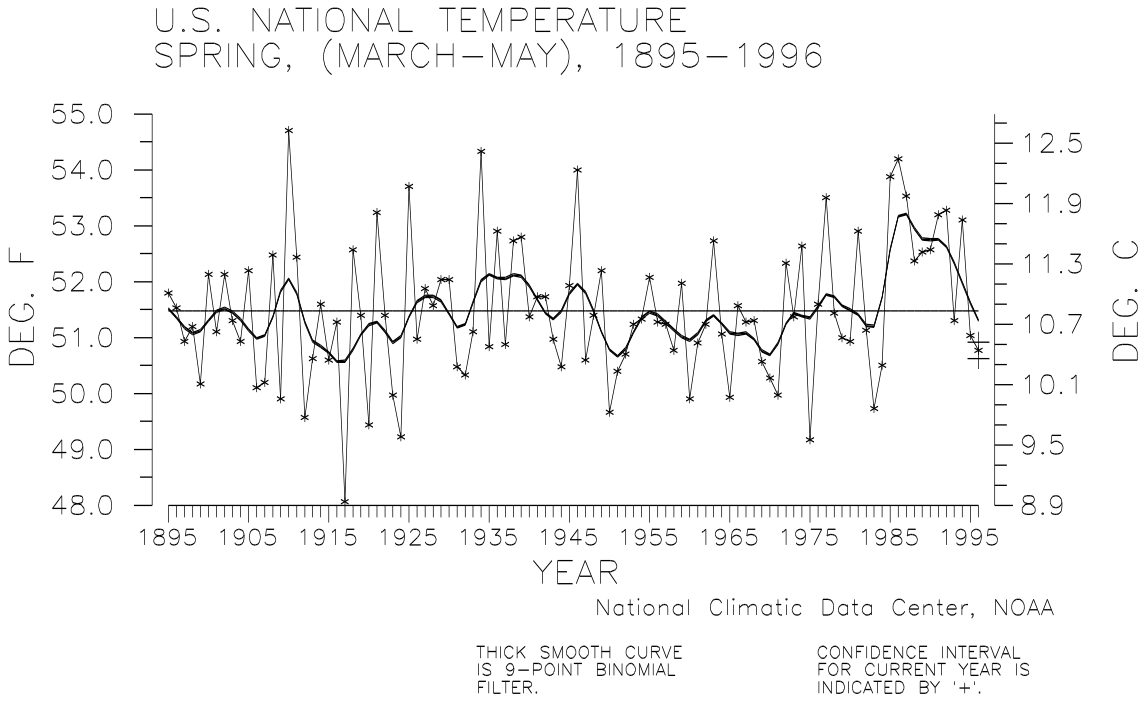

Figure 13

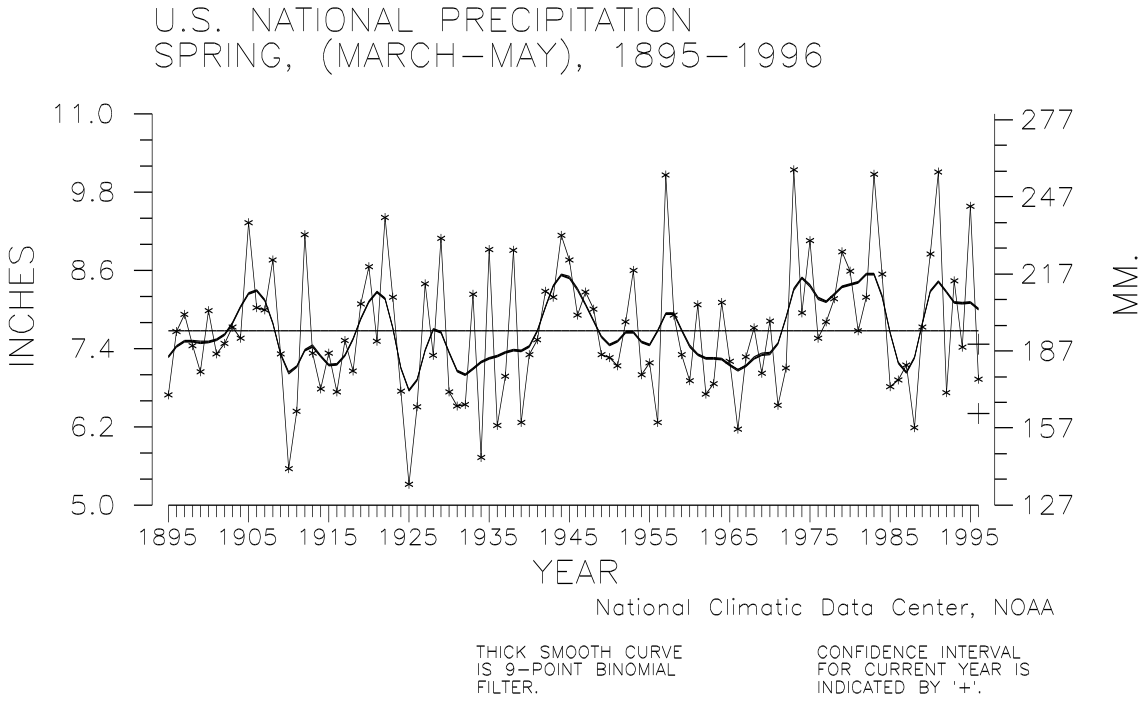

Figure 14

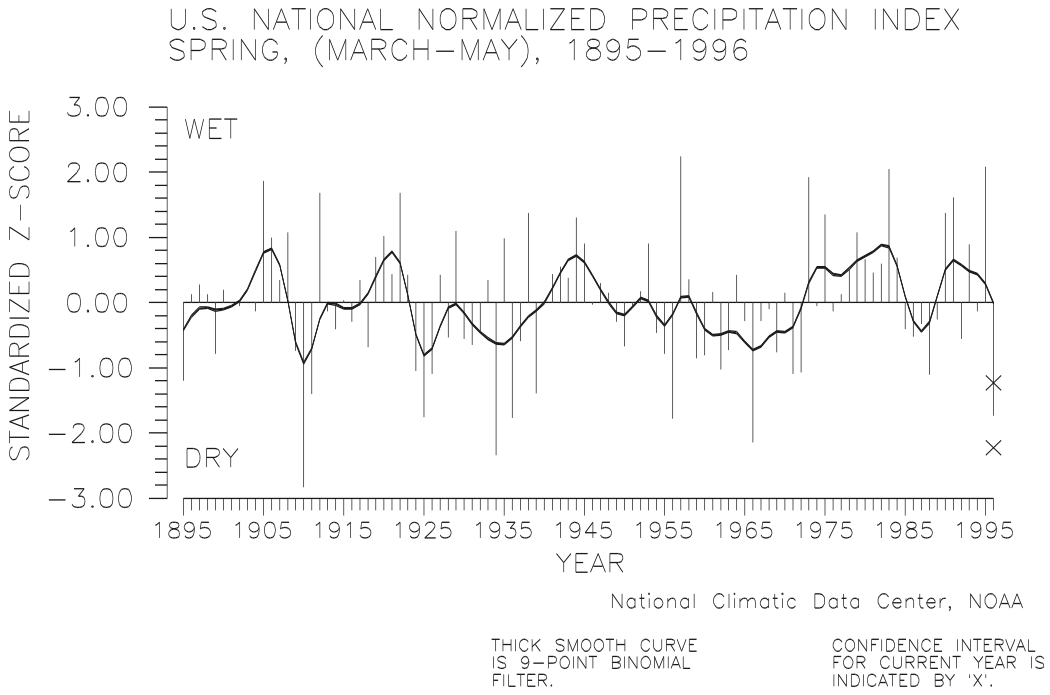

Figure 15

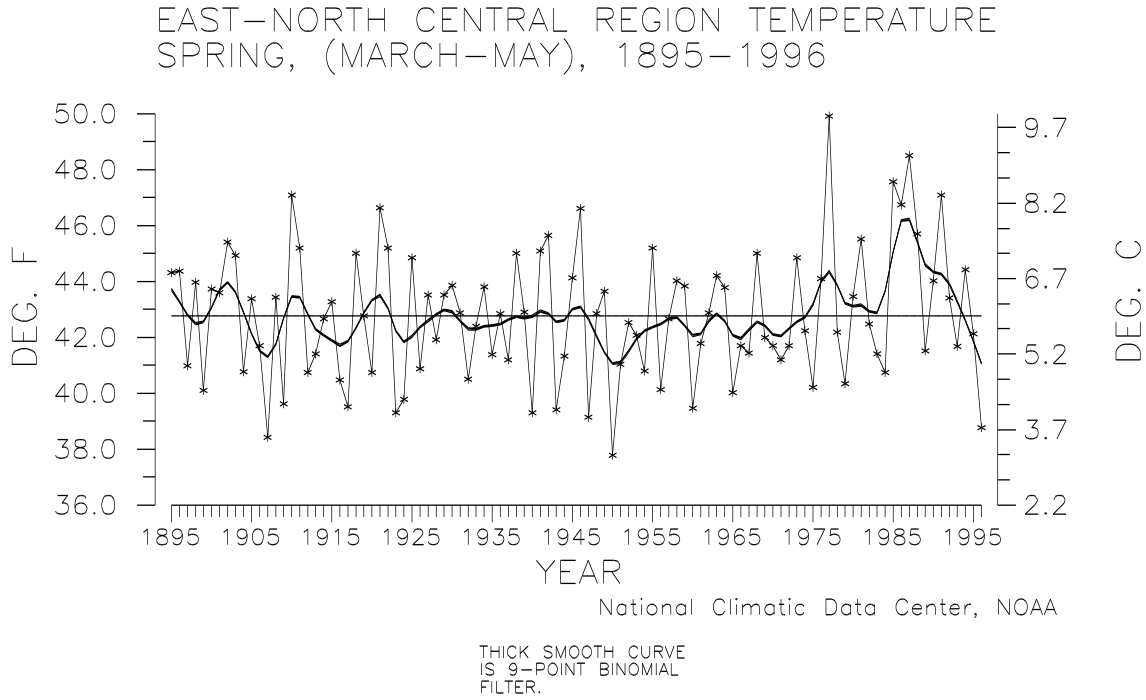

Figure 16

SPRING, MAR-MAY, 1996 STATEWIDE RANKS

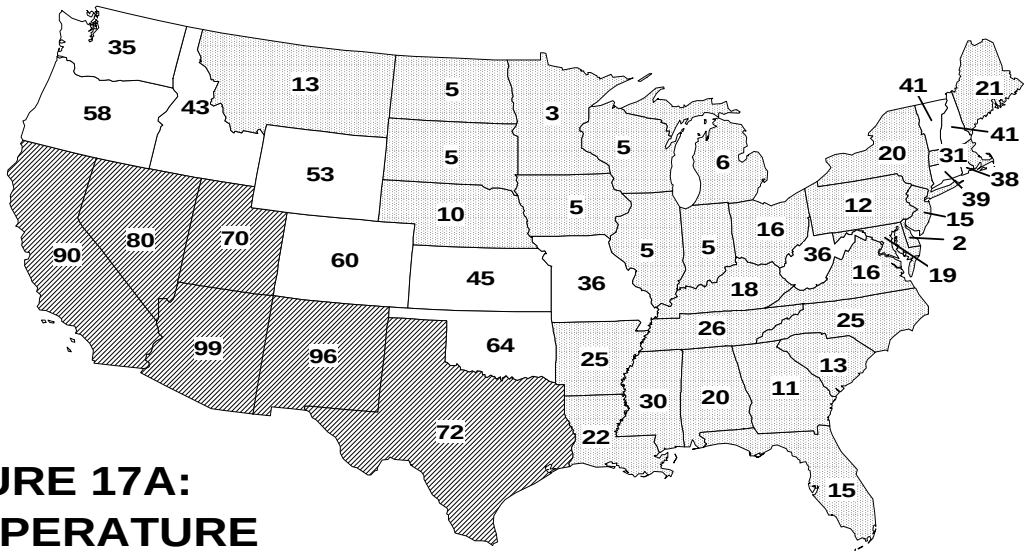

FIGURE 17A: TEMPERATURE

1 = Coldest
102 = Warmest

Temperature Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the warm third or cool third of their historical distribution are shaded.

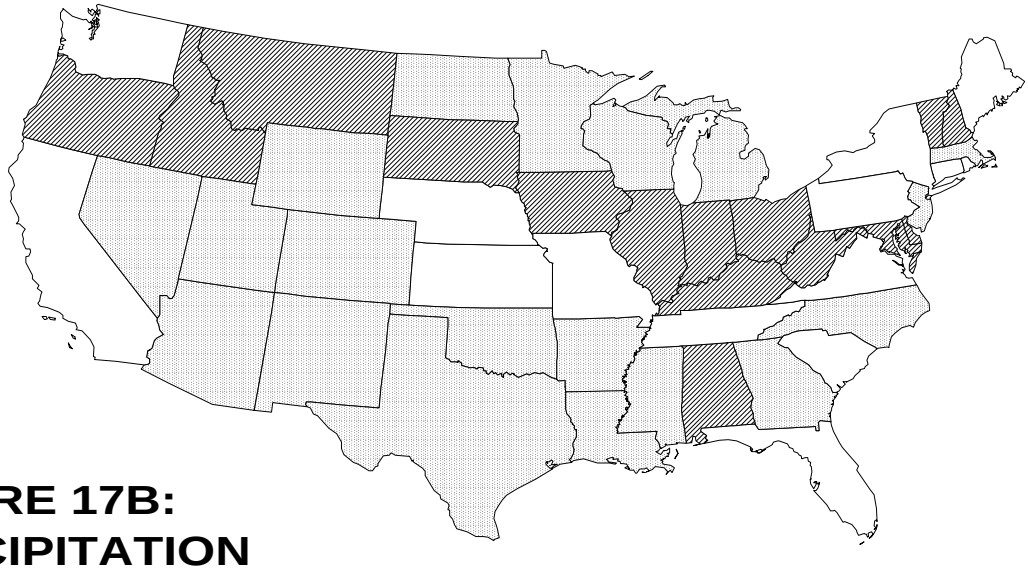

FIGURE 17B: PRECIPITATION

National Climatic Data Center, NOAA

Wet Third
Middle Third
Dry Third

Precipitation Rank Categories for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank in the wet third or dry third of their historical distribution are shaded.

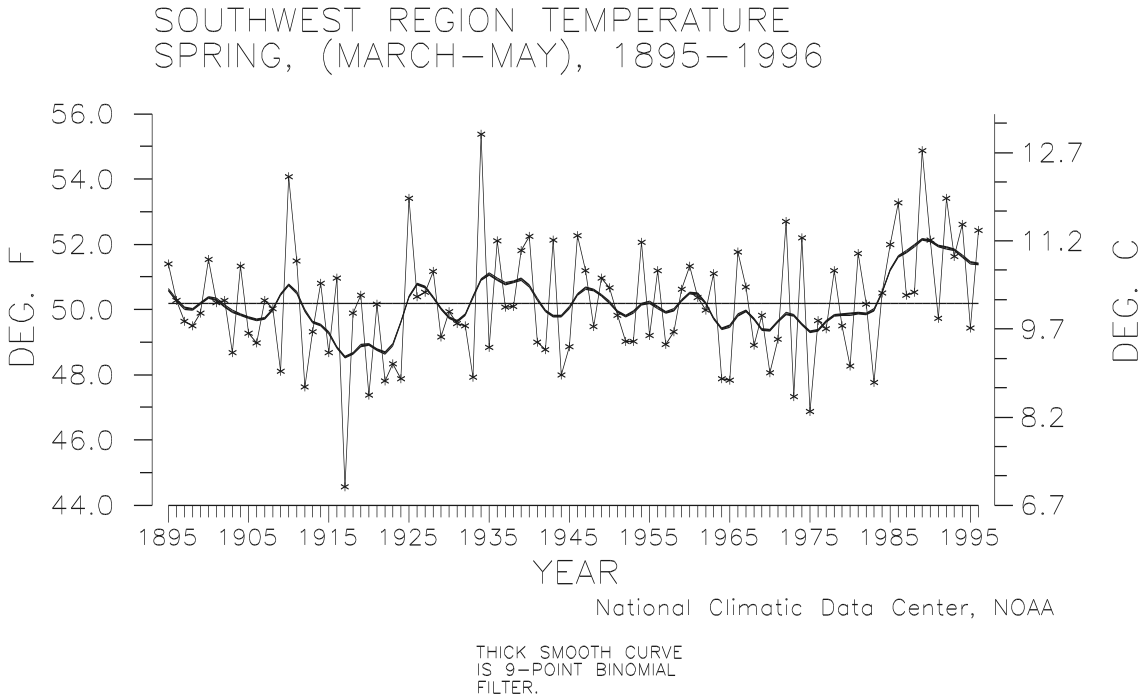

Figure 18

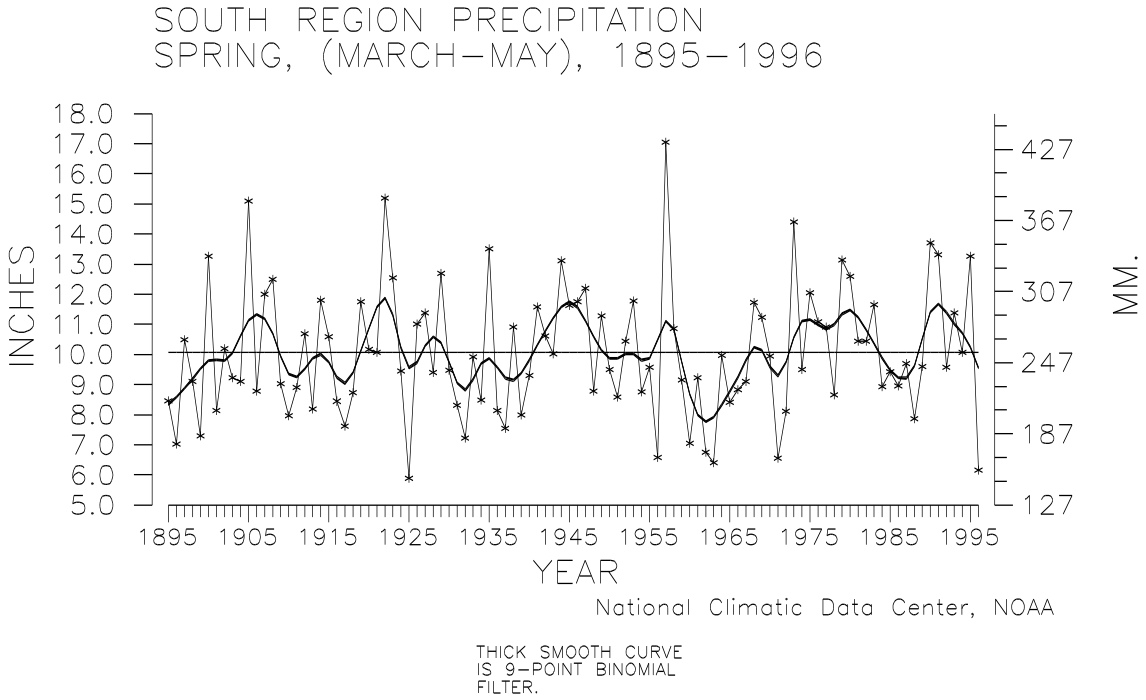

Figure 19

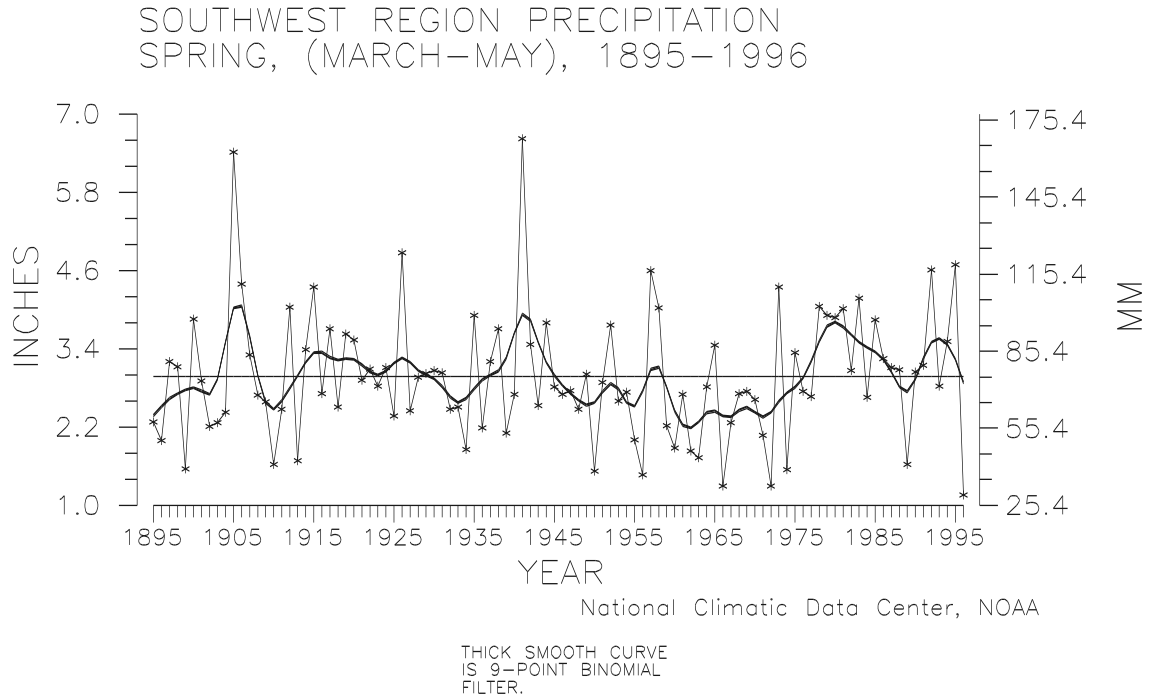

Figure 20

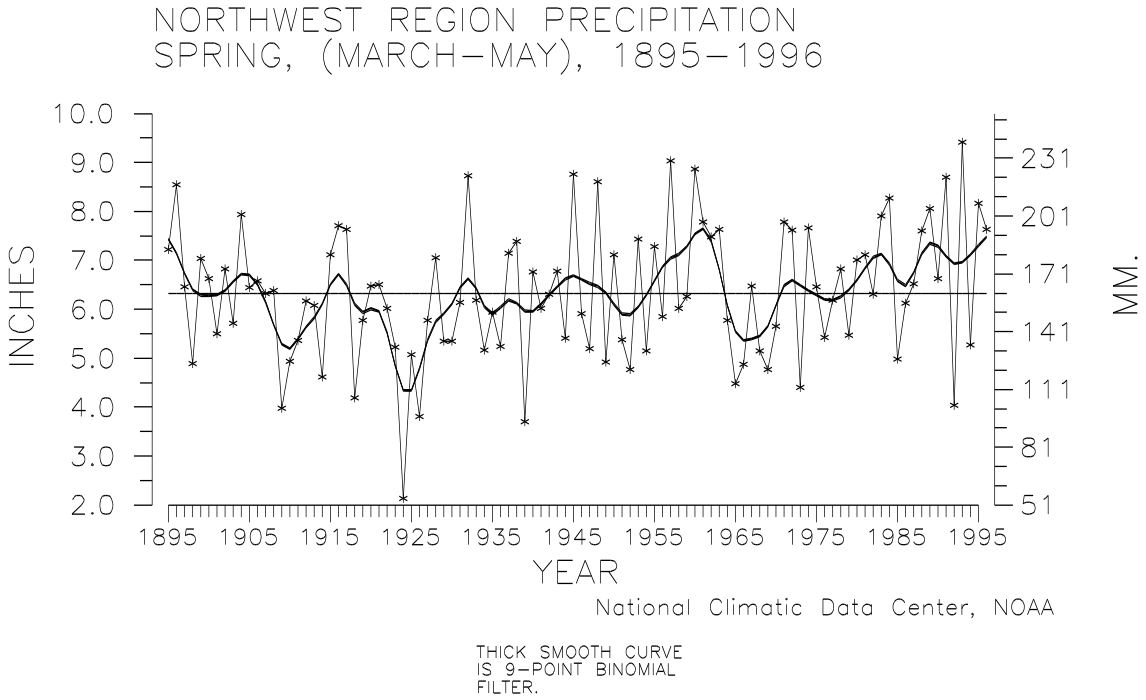

Figure 21

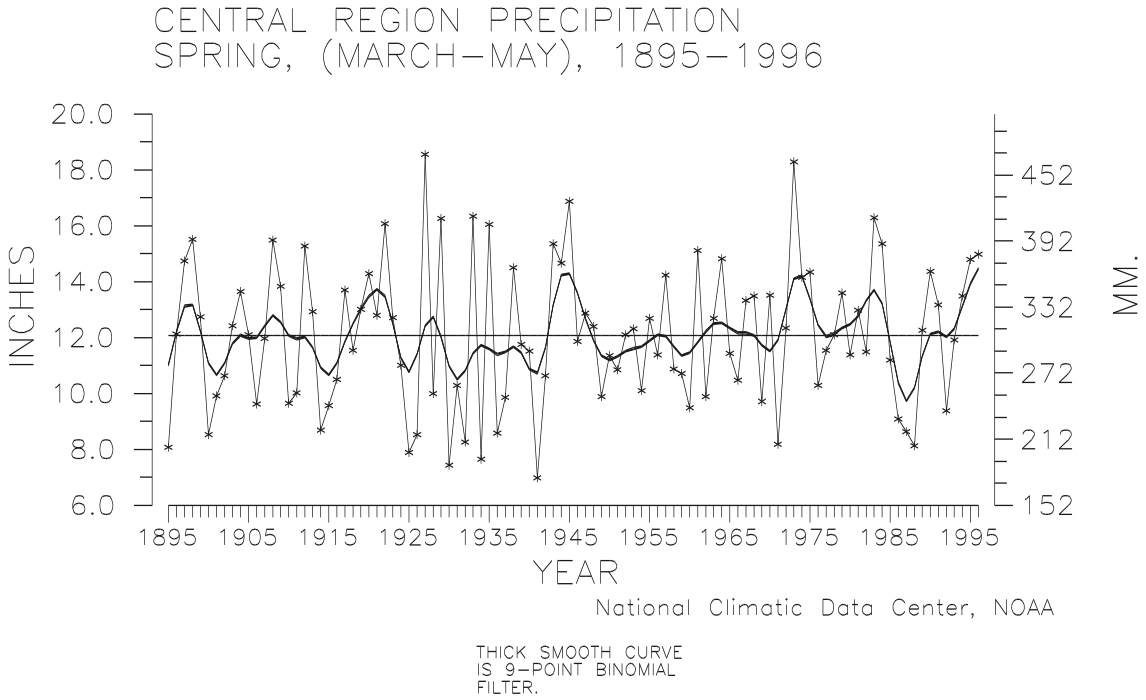

Figure 22

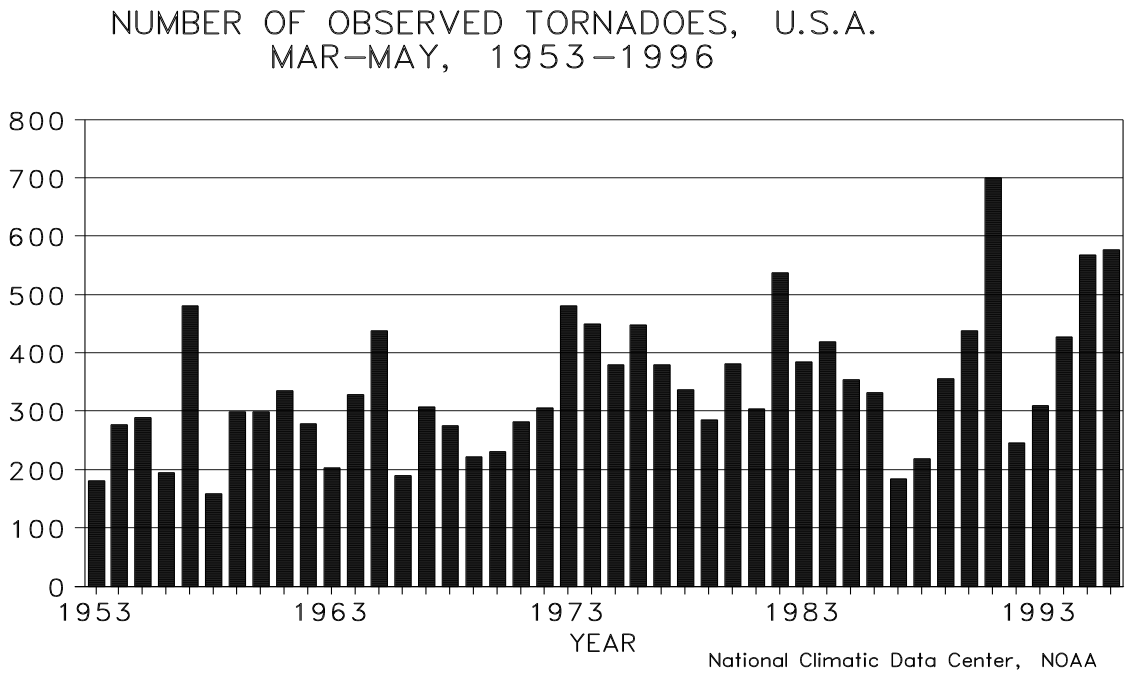

Figure 23